CLAIMS:

1. Method for magnetic resonance imaging of at least a portion of a body placed in a stationary and substantially homogeneous main magnetic field, the method comprising the following steps:

a) subjecting said portion to a diffusion-weighting sequence comprising an initial RF pulse and at least one diffusion gradient pulse;

b) generating a train of MR echoes by subjecting said portion to an imaging sequence comprising read-out gradient pulses and phase-encoding gradient pulses;

c) measuring said train of MR echoes;

d) repeating steps a) to c) until a complete imaging data set with a sufficient number of phase-encoding steps is measured;

e) correcting said imaging data set for macroscopic motions of said portion by means of an individual phase-correction of each train of MR echoes;

f) reconstructing an image from said imaging data set;

characterized in that the phase-encoding scheme of said imaging sequence is selected such that each train of MR echoes comprises at least one initial MR navigator echo, which forms an integral part of said imaging data set, wherein said phase-correction is derived from said MR navigator echo of the respective train of MR echoes.

2. Method of claim 1, characterized in that one initial MR navigator echo is generated without phase encoding.

3. Method of claim 2, characterized in that each train of MR echoes is generated with constantly increasing or decreasing phase-encoding.

4. Method of claim 3, characterized in that steps a) to c) are repeated with said imaging sequence comprising one variable phase-encoding step and a subsequent series of fixed phase-encoding steps, such that an interleaved phase-encoding scheme is achieved.

5. Method of claim 1, characterized in that a non-linear phase-correction of each train of MR echoes is performed in step e), which is calculated from said at least one MR navigator echo of the respective train of MR echoes and at least one reference MR navigator echo.

6. Method of claim 1, characterized in that said diffusion-weighting sequence comprises an RF refocusing pulse.

7. Method of claim 6, characterized in that said imaging sequence is an EPI (echo planar imaging) sequence, which does not comprise any RF pulses.

8. Device for magnetic resonance imaging of a body placed in a stationary and substantially homogeneous main magnetic field, the device comprising means for establishing said main magnetic field, means for generating magnetic field gradients superimposed upon said main magnetic field, means for radiating RF pulses towards said body, control means for controlling the generation of said magnetic field gradients and said RF pulses, means for receiving and sampling magnetic resonance signals generated by sequences of RF pulses and switched magnetic field gradients, and reconstruction means for forming an image from said signal samples, characterized in that said control means comprises a programming with a description of an imaging procedure according to the method of claim 1.

9. Computer program with a program code, which enables an imaging procedure to be carried out on a magnetic resonance imaging device, characterized in that said imaging procedure comprises the following steps:

a) subjecting said portion to a diffusion-weighting sequence comprising an initial RF pulse and at least one diffusion gradient pulse;

b) generating a train of MR echoes by subjecting said portion to an imaging sequence comprising read-out gradient pulses and phase-encoding gradient pulses;

c) measuring said train of MR echoes;

d) repeating steps a) to c) until a complete imaging data set with a sufficient number of phase-encoding steps is measured;

e) correcting said imaging data set for macroscopic motions of said portion by means of an individual phase-correction of each train of MR echoes;

f) reconstructing an image from said imaging data set,

wherein the phase-encoding scheme of said imaging sequence is selected such that each train of MR echoes comprises at least one initial MR navigator echo, which forms an integral part of said imaging data set, said phase-correction being derived from said MR navigator echo of the respective train of MR echoes.

10. Computer program of claim 9, characterized in that each train of MR echoes is generated with constantly increasing or decreasing phase-encoding, wherein steps a) to c) are repeated with said imaging sequence comprising one variable phase-encoding step and a subsequent series of fixed phase-encoding steps, such that an interleaved phase-encoding scheme is achieved.